

Analysis of factors affecting urban per capita housing area in China

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Abstract—Housing problems have become one of the hottest topics, influencing people's livelihood and national economy. This paper intends to re-analyze the per capita housing area, which characterizes the residents' happiness index, in order to measure the basic living condition. Taking into account of the large expansion of the floating population in the process of urbanization, we choose “urban resident population” to amend the “registration population”, which is the denominator of the index. We selected the data of residential investment, urban residents' consumption level and residential completion area from 1978 to 2015 to analyze the influence of independent variables on the per capita housing area, we found the volatility of housing price, which reduces the average level of urban per capita housing empirically.

Keywords—urban per capita housing area, influencing factors.

I. INTRODUCTION

As the least requirement of human beings, living circumstances should be the basic material basis. However, with the development of the economy, residents' income, occupation, age, family Engel coefficient, population structure, house price, loan mortgage policy and other factors are all affect the housing situation. On June 16, 2011, China Statistics Association put the Comprehensive Development Index (CDI) into the “Twelfth Five-Year Plan”, in which the “per capita housing use area” indicator is used to reflect the living conditions of residents in a

region, and it is an important tool for measuring the gap between housing supply and demand. In recent years, the set of calculation models adopted by some experts and scholars originated from the “Statistical Bulletin of Urban Housing Overview 2005”, published by the Ministry of Housing and Urban-Rural Development. The calculation formula for per capita residential area is:

Per capita residential building area (m^2 / person) = residential building area / resident population.

The resident population refers to the registered population of the local public security department that is

consistent with the residential statistics at the end of the reporting period. In terms of strict distinction, there is a difference between per capita housing area and per capita residential building area. The former refers to the per capita net area directly used by the residents in the plane of each floor of the house, but in the case of residential sales, it is generally not used to calculate the price. The latter is the basis of pricing often used in residential sales. The difference between the two is that the per capita building area includes the using area. In practice, they are usually converted with a coefficient of 0.75, that is, the per capita housing area (using area) = per capita housing construction area * 0.75. Actually the indicator of per capita housing area is more representative of improving people's livelihood needs. However, in order to compare horizontally, the article uses the per capita housing construction area when it comes to the per capita housing area index, so the actual value is less than the following table number.

We choose the per capita housing area of urban as the research object, and re-analyze the influencing factors of urban per capita housing area from the perspective of statistical caliber and empirical analysis. The structure of the article is as follows: the second part is the literature review, the third part is to re-calculate and analyze the per capita housing area of the city and to correct the past data. The fourth part is empirical research, based on the consumption theory of Keynes, to discuss the influences of relevant factors about the indicator. The fifth part is conclusion and suggestions.

II. LITERATURE REVIEW

On the basis of the calculation of “per capita housing area”, Liu L (2008) found that the calculation of “resident population” in the urban per capita housing area index should use the urban resident population instead of the household registration population. The statistical range of urban population should be consistent with the statistical range of urban housing. The Beijing Population Research Institute (2008) statistically surveyed the behavior of resident migrants in Beijing, and found that more than one-third of the floating population did not flow, and more than one-fifth of the resident population was a floating population. It can be seen that using the “resident population”, not the registration population, is more accurate.

From the perspective of per capita housing area of floating population, Logan et al (1999) argue that the inequality of urban housing in China is growing, and the rural population living in urban areas is living in poor conditions. Hiroshi SATO (2006) compared the household survey data released by CASS in 1999 and 1988, focusing on the two social factors of urban and rural population mobility and housing marketization. The analysis found that the gap between urban residents and floating population in housing conditions is wide, and urban migrant families China began to breed new “housing poverty”. Li X (2013) uses the absolute income hypothesis as a theoretical prototype, by establishing a multiple linear regression model, and confirms that the resident population is one of the significant factors affecting Shanghai's per capita housing area. Wu W and Wang H (2002) have found that the floating population in the

aspects of per capita housing area, housing quality index, and housing satisfaction are far lower than the migrant population and local residents in the Beijing-Shanghai survey. It is recommended that the national housing security policy should be actively Improve the housing conditions of the floating population. Mao F (2009) systematically described the living conditions of the floating population in Hangzhou by questionnaires, he found that the per capita housing area of the floating population in Hangzhou was only 8.6 square meters, but it was still higher than the national average in horizontal comparison. Zhang F and Sun L (2010) took the data of “Beijing 1% Floating Population Survey” as the research object, they found that 71% of the floating population in Beijing had an average available space of less than 20 square meters, and 40% of the housing area was less than 10 square meters. The living conditions of the floating population need to be improved urgently.

Zheng H (2013) compared the data of Fifth (2000) and Sixth census (2010), the per capita housing construction area of the country has increased from 22.8 square meters to 31.1 square meters. The overall household housing congestion has been significantly relieved, and has begun to shift to a medium-sized and large-sized apartment housing structure. Ge H, Zhang J, and Liu Ch (2012) empirically analyzed the influence of “demographic characteristics” and “current housing conditions” on the willingness of urban residents to improve housing conditions, using logistic regression model and household survey data, they demonstrated the per capita housing area to improve housing conditions. Willingness has a significant negative impact, that is, the smaller the per

capita housing area, the stronger the willingness of residents to improve housing conditions. Jin H and Ren H (2010) discussed the family Engel coefficient, using the Granger causality test and the generalized impulse response method confirmed that the Engel coefficient has a strong influence on the per capita housing area and can be seen in the current period, that is, from the current trend of Engel coefficient, residents have a tendency to expand their demand for per capita housing.

The researches of different scholars are based on the discussion of some of the factors affecting the per capita housing area of urban areas. There is no systematic analysis of the revised indicators. Based on these, we consider adding some other influencing factors, in order to make the empirical results can be closer to reality and can more effectively explain the real problems.

III. ANALYSIS OF THE CURRENT SITUATION OF URBAN PER CAPITA HOUSING AREA

With the reform of the housing system, the property of housing has become increasingly prominent, as one kind of products, in order to meet the needs of residents for survival, development and enjoyment, housing consumption is constantly increasing. The physical manifestation is mainly the continuous increase in the per capita housing area. According to the data in the 2014 China Statistical Yearbook, as of the end of 2012, the per capita housing construction area of urban residents nationwide has reached 32.9 square meters. The trend from 2002 to 2012 is shown in Figure 1:

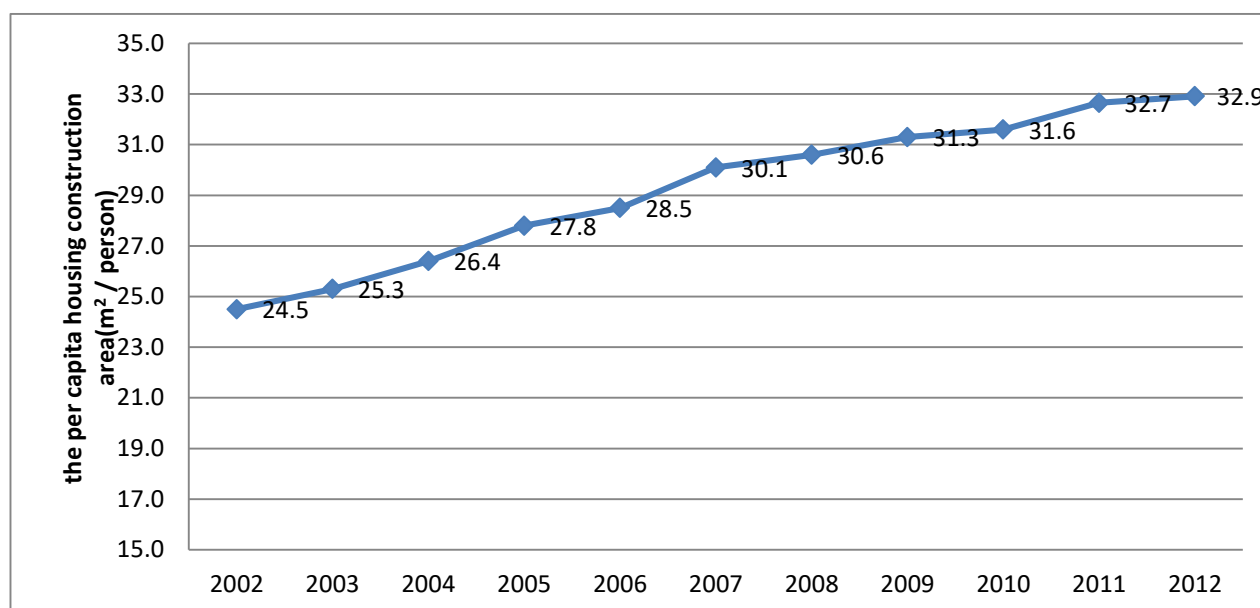


Fig.1: Trends in urban per capita housing area between 2002 and 2012

Data Source: China Statistical Yearbook 2014

As to china's regional economic development level, the eastern, central and western regions¹ have different patterns. The following figure shows the comparison of per capita housing area of urban areas in the eastern, central and western regions.

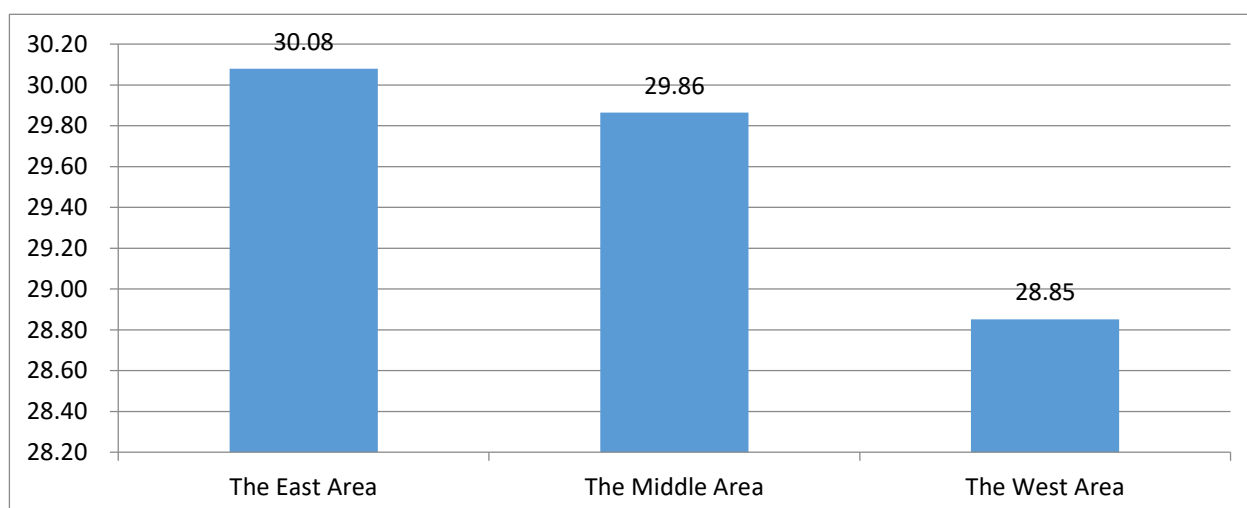


Fig.2: Per capita housing area in eastern, middle and western cities of China in 2012

From Figure 2, the per capita housing area of the eastern, central and western cities is the same as that of

the regional economic development level, and it can be predicted that the per capita housing area of the city has a

¹ There are 12 provincial-level administrative regions in the western region, namely Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi, and Inner Mongolia; There are 8 provincial-level administrative regions in the central region, namely Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; 11 provincial-level administrative regions in the eastern region, including Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan. Provinces.

great relationship with the regional economic development level. According to the household survey of the sixth census data, some scholars have proposed: the average per capita is 8 square meters, 9-16 square meters, 17-29 square meters, 30-49 square meters, 50-69 square

meters, 70 square meters. Above the meter, they are defined as: low-rent housing access standards, affordable housing standards, subsistence, well-off, comfortable, luxury.

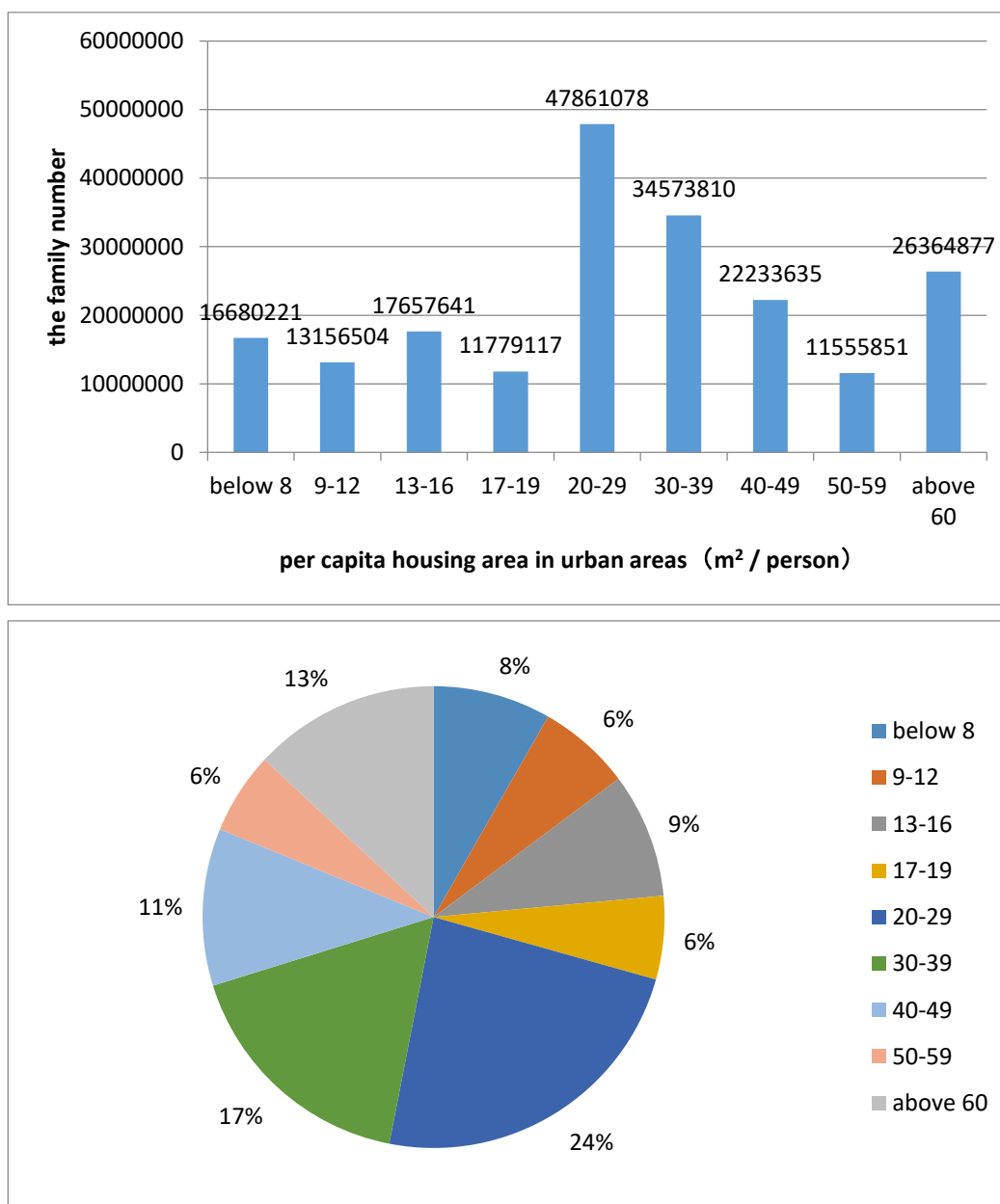


Fig.3: Distribution of households per capita housing area in urban areas in 2010

Data Source: Data of the sixth census in 2010. Volume VIII. Housing

According to the data of sixth census (2010), the proportion of urban households in the country to meet the

standard of subsistence and well-off housing is relatively large, accounting for 58%. The proportion of urban

households meeting the low-rent housing and affordable housing access standards is relatively high, at 23%. This indicates that the city still has a high proportion of family housing difficulties. The government should pay attention to and continuously improve the housing of this type of households. condition. Comfort and luxury total 19%. It can be seen that the interior area of a family of three is favored between 90 and 100 square meters, which is also in line with China's current national conditions.

3.1 Reanalysis from the calculation method

According to the "Gazette" issued by the Ministry of Housing and Urban-Rural Development in 2005, the calculation of the per capita housing area of urban areas depends on the accuracy of residential building area and residential population. According to the statistical method of the "Gazette", the resident population refers to the registered population of the local public security department that is consistent with the residential statistics at the end of the reporting period. When calculating the urbanization rate, according to the statistics of the Bureau of Statistics, the so-called urban population generally refers to the urban resident population, which refers to the population who actually live in a certain area for a certain period of time (more than half a year), in addition to the local household registration population, including foreign non-agricultural population and agricultural population.

According to the data of the sixth national census in 2010, among the population of 31 provinces, autonomous regions and municipalities directly under the Central Government, the amount of the population which the place of residence and the household registration place is inconsistent, and leaving the household registration area for

more than half a year is about 260 million. Compared with the fifth national census in 2000, the number has increased by about 117 million, an increase of about 81.03%. The calculation basis for the "household population" as the "resident population" is indeed inaccurate. For the sake of accuracy and statistical feasibility, this article will use the "urban resident population" to amend the "registration population".

3.2 Reanalysis from the development trend of the floating population

The 2012 Central Economic Work Conference pointed out that urbanization is the historical task of China's modernization and the greatest potential for expanding domestic demand. The process of the "new urbanization" has boosted regional GDP growth, while it brought about various social problems. The 2013 government work report pointed out that we should continue to actively and steadily promote urbanization. However, the urbanization process must be accompanied with the floating of population, which is manifested by the large number of migrant workers moving into cities to make a living. The specific figures are shown in Table 1:

Table 1: China's floating population from 2000 to 2015

Year	Population Leaving the household registration (billion)	Floating population (billion)
2000	1.44	1.21
2005	—	1.47
2010	2.61	2.21

2011	2.71	2.30
2012	2.79	2.36
2013	2.89	2.45
2014	2.98	2.53
2015	2.94	2.47

Data Source: 2016 China Statistical Yearbook.2000 and 2010 are the data of the current census time, and the data of the remaining years are calculated according to the annual population sampling survey.

The float of people has never been done overnight, but has evolved with economic and social development. The size of China's floating population has continued to grow for more than 30 years after the reform and opening up, especially since the 1990s, the growth rate has accelerated significantly, from 6.57 million in 1982 to 247 million in 2015 (Figure 4). About 40% of the local residents in large cities such as Shanghai, Guangzhou and Beijing are floating population.

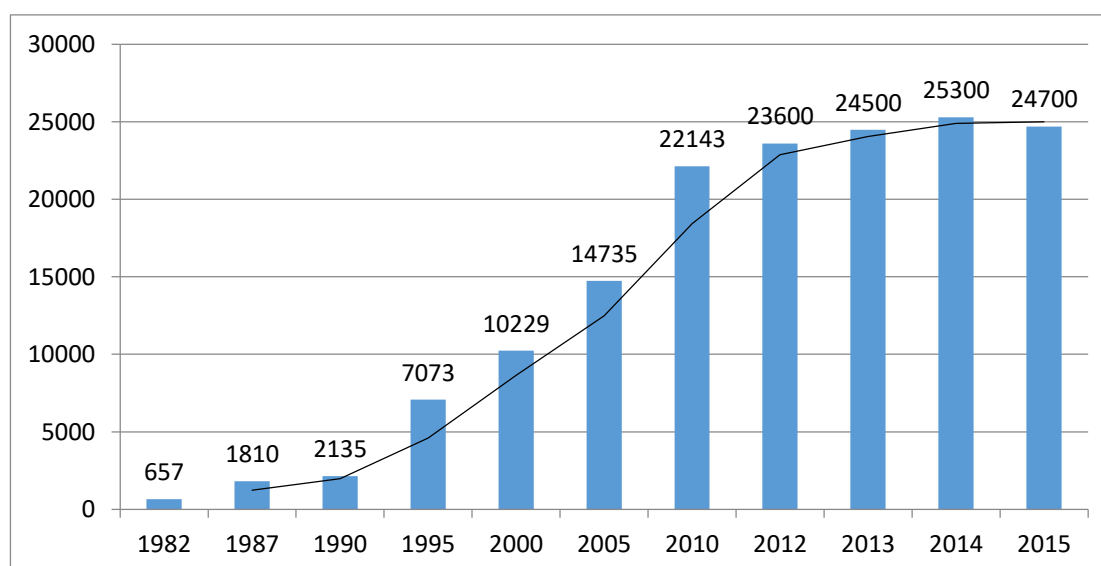


Fig.4: 1982-2015 floating population growth trend (Unit: thousand people)

Data Source: Estimated based on previous national census data

According to the Ministry of Science and Technology's "Changes in the Trend of Floating Population and Self-Evaluation" survey, more and more migrants are planning to be "permanent residents" rather than "temporary residents", especially those from rural areas, only 10% people are willing to return to the countryside.

Therefore, the intangible pressure of the "floating

population" on the per capita housing area of urban areas cannot be underestimated. How to ensure the housing needs of the resident population or the floating population will be an important aspect of improving people's livelihood.

3.3 Correction of the index of urban per capita housing area

According to the 2010 census data, there are 403

million urban populations surveyed by household registration sites, and 266 million people in townships and towns, totaling about 670 million people. In addition, according to the reasons of migration, business, job transfer, study and training, etc., the rural population of the household registration area is about 34.97 million in the other towns. In order to ensure the validity of the revised index, 1.19 million children aged 0-4 years old are excluded, so the number of people who need to be raised is about 33.77 million, that is, the amount of the "urban resident population" is about 700 million.

According to the sixth census data, as of 2010, the total area of residential buildings nationwide was 39.3 billion square meters, of which the total residential area of urban residential buildings was 10.66 billion square meters, and the townships were 8.04 billion square meters. Therefore, the total area of urban residential buildings is about 18.7 billion square meters.

According to the per capita residential building area (m^2 / person) = residential building area / resident population, the revised value of urban per capita housing area is about 26.7 square meters / person, slightly lower than the published figures (31.6 square meters / person).

IV. EMPIRICAL ANALYSIS

We collected the data from 1978 to 2012, such as urban per capita housing area (UPCHA), the per capita disposable income (PDI) of urban households, the urban population (UP), the lag data of completed area of housing ($HA(-1)$), urban residents' consumption level (UCL), and housing investment (HI).

4.1 Theoretical basis

According to Keynes's absolute income hypothesis, consumer's spending depends on absolute income levels, and consumer's spending is a function of real income. The basic formula is: $C = \alpha + \beta * Y_t$

Among them, C is the current consumption; α is the basic spontaneous consumption of necessary; $\beta(0 < \beta < 1)$ is the marginal propensity to consume, and the marginal propensity to consume decreases with the increase of income; Y_t is the current income.

Housing consumption expenditure is a function of actual income. As incomes increase, although the marginal propensity to consume in households declines, overall housing consumption expenditures increase. Theoretically in the housing consumption function, housing consumption expenditure is a function of income, and there is a linear relationship between the two, which can be derived that, disposable income affects the per capita housing area.

4.2 Model establishment and regression analysis

Based on the above assumptions, we established a multiple regression model:

$$UPCHA = a_0 + a_1 PDI + a_2 UP + a_3 HA(-1) + a_4 UCL + a_5 HI + C$$

Through regression analysis, the initial prediction equation can be:

$$UPCHA = 0.00075UP - 0.003938UCL + 0.003767PDI - 2.01HA(-1) - 0.000221HI - 8.50454$$

$$t = (5.4666)^{**} (-7.3430)^{*} (5.2084)^{*} (-2.1242)^{**} (-1.5807)^{**} (-3.6002)^{*}$$

Firstly, the correlation coefficient test is performed on the five independent variables, and the results are obtained:

$$R^2=0.968284 \quad F=472.3738 \quad DW=1.388563$$

4.3 Multicollinearity test

	UPCHA	UP	UCL	PDI	HA__1__	HI
UPCHA	1.000000	0.980213	0.944723	0.943119	0.903110	0.843717
UP	0.980213	1.000000	0.967157	0.954472	0.943055	0.851710
UCL	0.944723	0.967157	1.000000	0.996337	0.915156	0.947683
PDI	0.943119	0.954472	0.996337	1.000000	0.905047	0.965445
HA__1__	0.903110	0.943055	0.915156	0.905047	1.000000	0.831934
HI	0.843717	0.851710	0.947683	0.965445	0.831934	1.000000

The two-two correlation coefficient between the five explanatory variables is above 80%, and the correlation coefficient between UCL and PDI exceeds the sample's coefficient of determination R^2 , indicating that there is multicollinearity in the prediction.

Then, each dependent variable is used to make a simple regression on the dependent variable, thereby determining the importance of the explanatory variable and sorting the explanatory variables.

$$UPCHA = a_0 + a_1 UP + U \quad (1)$$

$$UPCHA = a_0 + a_1 UCL + U \quad (2)$$

$$UPCHA = a_0 + a_1 PDI + U \quad (3)$$

$$UPCHA = a_0 + a_1 HA(-1) + U \quad (4)$$

$$UPCHA = a_0 + a_1 HI + U \quad (5)$$

The regression results are as follows :

$$UPCHA = 0.000593 UP - 8.013116 \quad (6)$$

$$t = (-9.096032) \quad (29.000003)$$

$$R^2 = 0.962243 \quad F = 841.0016$$

$$UPCHA = 0.001616 UCL + 6.155674 \quad (7)$$

$$t = (16.69021) \quad (7.755052)$$

$$R^2 = 0.894083 \quad F = 278.5633$$

$$UPCHA = 0.001388 PDI + 7.009206 \quad (8)$$

$$t = (16.69021) \quad (7.755052)$$

$$R^2 = 0.889682 \quad F = 266.1357$$

$$UPCHA = 0.000117 HA(-1) - 2.467609 \quad (9)$$

$$t = (11.89716) \quad (-1.435205)$$

$$R^2 = 0.815607 \quad F = 141.5423$$

$$UPCHA = 0.000558 HI + 10.55886 \quad (10)$$

² * indicates that the 1% significance level is significant,

and ** indicates that the 5% significance level is significant.

$$t = (8.980185) \quad (9.804996)$$

$$R^2 = 0.709619 \quad F = 80.64373$$

we preliminarily concluded that housing investment (HI) may be the most common cause of multicollinearity. After removing the HI, we got the following equation.

$$UPCHA = 0.000909UP -$$

$$0.003759UCL + 0.002798PDI - 2.81HA(-1) - 11.65039$$

$$t = (13.80736) \quad (-6.992481) \quad (7.104842) \quad (-3.422937) \quad (-8.927060)$$

$$R^2 = 0.987238 \quad F = 560.86586$$

After removing HI, the overall saliency of the equation after adding UCL is greatly improved, the t value of each regression coefficient is also greatly increased, and the equation fitting is very good. Therefore, it can be determined through analysis that the housing investment amount (HI) is multi-co- The reason for linearity.

4.4 Empirical analysis

From the regression results, the facts are that the growth of urban population in the early stage of steady state has a positive impact on the improvement of urban per capita housing area, indicating that the acceleration of

urbanization has a positive effect on the improvement of housing conditions for residents; at the same time, The increase of the disposable income of urban residents will increase the per capita housing area of urban areas; the increase in the level of household consumption will reduce the demand for housing, indicating that housing as an investment behavior, it will decrease in the income share of residents with the growth of consumption, people began to pursue much more Improved consumption; Due to the limited influencing factors listed in the article, it is impossible to estimate the specific impact of commodity housing prices on the lag of the first stage of housing completion, but from the empirical results, the increase of house stocks did not bring about an increase in house-living level, combined with the current situation (Figure 5) is largely due to the volatility of housing price. The majority of urban residents are holding a wait-and-see attitude, considering the urban resident population is steadily increasing, the new group is unable to purchase commercial housing, so that a large number of houses are vacant, which reduces the average level of urban per capita housing.

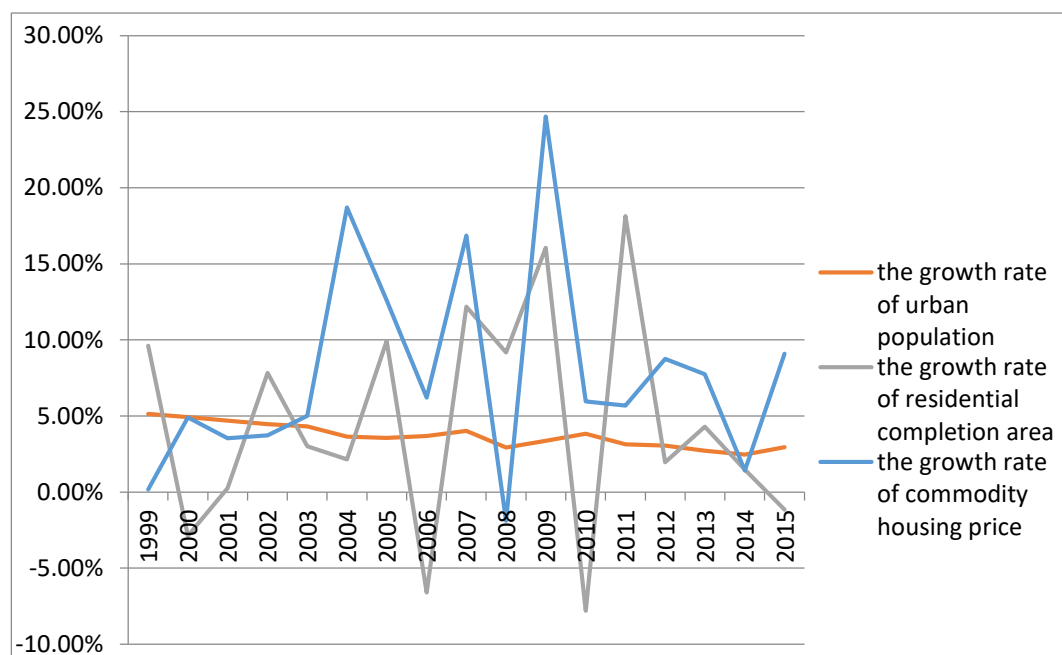


Fig.5: 1999-2015 three ratio growth trend

Data Source: 2016 China Statistical Yearbook. Real Estate

V. CONCLUSIONS AND RECOMMENDATIONS

From the statistics and empirical analysis, the factors affecting the per capita housing area of urban areas have been analyzed. Both the growth of urban population and the increase of disposable income of urban residents are calling for a higher requirement for urban per capita housing area. From the current institutional system and market mode, in order to effectively improve the living standards of urban residents, the government needs to introduce corresponding aspects in real estate investment and urban population mobility to meet the needs of living and working.

5.1 Innovate population management and strengthen housing security investment

Regardless of the statistics or empirical test, the impact

of urban population changes on per capita housing area is significant. Especially under the vigorous promotion of the “new urbanization” construction, it will inevitably bring about the continuous growth of urban population, among which the growth of the floating population. How to control the population factor and rationally improve the per capita housing area of low-income people is of great significance for maintaining social stability and ensuring the smooth progress of urbanization. Combined with the empirical results and China's national conditions, the following suggestions are proposed around the population issue:

Firstly, accelerating the reform of the household registration system. For a long time, China has implemented a household registration system that divides urban and rural areas. Under the current household

registration system, urban population is divided into registered and floating population. The floating population rarely enjoys the services and guarantees provided by the local government, including employment, education, medical care, and social security. The floating population, which accounts for 1/3 of the permanent population of the town, is on the edge of semi-urbanization or urbanization. Relaxing the hukou's restrictions on the purchase of migrants can be of great help in solving the problem of the floating population's housing.

The second is to treat differently and continue to expand the construction of affordable housing. Dividing urban population from the perspective of income, it is more necessary to help low- middle income groups, and with the acceleration of urbanization, the migration of more and more rural population will inevitably bring more pressure on urban housing. At present, the coverage of urban affordable housing in China is less than 10%, and quite a few poor families have not received the protection they deserved, while the proportion of developed countries is basically maintained at around 25%-30%. Therefore, the coverage of affordable housing such as affordable housing and low-rent housing has to be expanded, not only be implemented in absolute quantities, but also be implemented in the geographical scope. For those who have the ability to pay, the rational improvement of urban per capita housing area should mainly rely on market regulation. The tools implemented by government behavior can effectively unblock the real estate market information by adjusting the relationship between the growth of residential completion area and the growth of commercial housing prices.

The third is to pay attention to the housing needs of big cities. The article is limited to the national data as a sample, and does not take into account the special circumstances of some megacities. The prominent problem in big cities is not only the huge population base, but also the huge mobility of the population. Taking Beijing as an example, it is very difficult to rent and buy a house. The new round of "National New Urbanization Planning (2014-2020)" also pointed out: "The structure of the housing market will be adjusted to be basically reasonable, and realizing the supply of commercial housing, as well as the construction of affordable housing.

5.2 Paying attention to the construction of people's livelihood

The per capita housing area of urban areas is only an indicator to measure the residents' housing situation. The purpose is to guide all stakeholders to pay attention to the housing needs and achieve the goal of "having room to live". Under the context of promoting urbanization, improving the quality of urbanization and implementing urbanization benefits are the important points of future urban development. The speed of economic growth is no longer the only goal pursued, how to achieve high quality of life under the current scale is the key issue to be considered. The paper selects the urban per capita housing area as the blueprint for improving the people's livelihood construction. Through the analysis of the combination of theory and evidence, the main purpose is to use this "people's livelihood concept" to arouse the "people's livelihood construction" of the whole society.

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